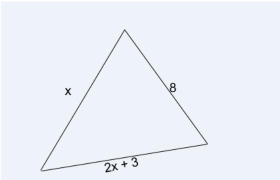
Warm-up!
Describe the possible values for x.



$x+2x+3>8$ $\quad$ $x>\frac{5}{3}$

$2x+3+8>x$ $\quad$ $x>-11$

$x+8>2x+3$ $\quad$ $x<5$

$x>0$

$2x+3>0$

$x>-\frac{3}{2}$

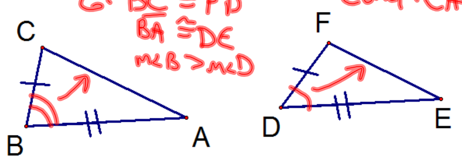
$\frac{5}{3}<x<5$

5.6 Inequalities in Two Triangles and Indirect Proof

Theorem 5.13-Hinge Theorem--If 2 sides of one triangle are congruent to 2 sides of another triangle, and the included angle of the 1st triangle is greater than the included angle of the 2nd triangle, then the 3rd side of the 1st triangle is greater than the 3rd side of the 2nd triangle.

G: $\overline{BC} \cong \overline{FD}$, $\overline{BA} \cong \overline{DE}$, $m\angle B > m\angle D$

Cond: $CA > FE$

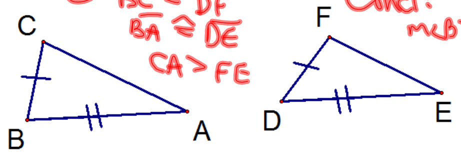


gsp demo

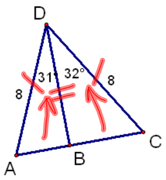
Theorem 5.14-Converse of the Hinge Theorem--If 2 sides of one triangle are congruent to 2 sides of another triangle, and the 3rd side of the 1st triangle is greater than the 3rd side of the 2nd triangle, then the included angle of the 1st triangle is greater than the included angle of the 2nd triangle.

G: $\overline{BC} \cong \overline{DF}$, $\overline{BA} \cong \overline{DE}$, $CA > FE$

Cond: $m\angle B > m\angle D$

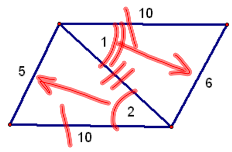


Compare the listed sides or angles.



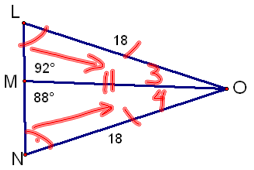
BC $>$ AB

Compare the listed sides or angles.



$m\angle 1$ $>$ $m\angle 2$

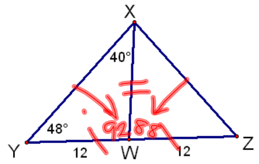
Compare the listed sides or angles.



LM < MN

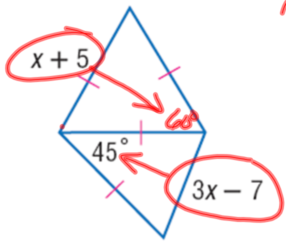
m∠4 > m∠3

Compare the listed sides or angles.



XZ < XY

Write an inequality to describe the possible values of x.



Restr.

$x+5>0$
$x>-5$

$3x-7>0$
$x>\frac{7}{3}$

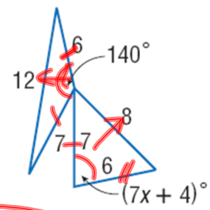
$x+5>3x-7$
$12>2x$
$6>x$

$x<6$

$\boxed{\frac{7}{3}<x<6}$

Write an inequality to describe the possible values of x.

$7x+4<140$
$19\frac{3}{7}>x$

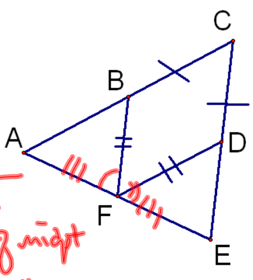


Restr.

$7x+4>0$
$x>-\frac{4}{7}$

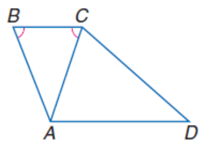
$-\frac{4}{7}<x<19\frac{3}{7}$

Given: $\overline{BF} \cong \overline{DF}$; $\overline{BC} \cong \overline{CD}$;
F is the midpoint of $\overline{AE}$;
m∠DFE > m∠AFB
Prove: CE > AC



S.	R.
① ~~~	① Given
② $\overline{AF} \cong \overline{FE}$	② def of midpt
③ DE > AB	③ Hinge thm
④ BC = CD	④ def of ≅
⑤ CD+DE > AB+BC	⑤ Add.
⑥ CD+DE = CE AB+BC = AC	⑥ SAP
⑦ CE > AC	⑦ Subst.

38. **Given:** $\angle B \cong \angle ACB$
Prove: $AD + AB > CD$

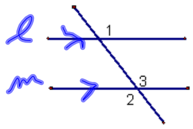


Indirect Proof
1. Assume conclusion is false
2. Reason until you contradict the given
3. State assumption is false

Also called proof by contradiction.

Example 1
Given: $\angle 1 \ncong \angle 2$

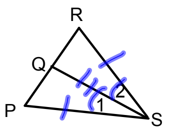
Prove: $\angle 1 \ncong \angle 3$



① Assume ∠1 ≅ ∠3
then l ∥ m b/c corr. ∠s converse
then ∠1 ≅ ∠2 b/c alt ext ∠ thm
* Contradicts the given
Our assumption is false
∴ ∠1 ≇ ∠3

Example 2:
Given: $\overline{SQ}$ bisects $\angle PSR$
$\angle PQS \ncong \angle RQS$

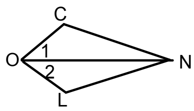
Prove: PS ≠ RS



① Assume PS = RS
∠1 ≅ ∠2 b/c def of ∠ bis
QS ≅ QS b/c of Reflexive
then △PQS ≅ △RQS by SAS
That means ∠PQS ≅ ∠RQS b/c CPCTC
* Contradicts given
Our assumption is false
∴ PS ≠ RS

Example 3:
Given: $\overline{CO} \cong \overline{LO}$
$\overline{CN} \cong \overline{LN}$

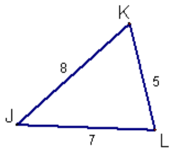
Prove: $\overline{ON}$ does NOT bisect $\angle COL$



① Assume $\overline{ON}$ bisects ∠COL

Example 4
Given: picture

Prove: m∠K < m∠L

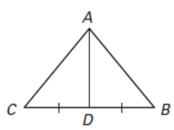


What's the first line?
Assume m∠K > m∠L OR m∠K = m∠L

Indirect Proof Arrange statements A–F in order to write an indirect proof of Case 1.

GIVEN: $\overline{AD}$ is a median of $\triangle ABC$.
$\angle ADB \cong \angle ADC$

PROVE: $AB = AC$



Case 1:

A. Then $m\angle ADB < m\angle ADC$ by the converse of the Hinge Theorem.
B. Then $\overline{BD} \cong \overline{CD}$ by the definition of midpoint. Also, $\overline{AD} \cong \overline{AD}$ by the reflexive property.
C. This contradiction shows that the temporary assumption that $AB < AC$ is false.
D. But this contradicts the given statement that $\angle ADB \cong \angle ADC$.
E. Because $\overline{AD}$ is a median of $\triangle ABC$, D is the midpoint of $\overline{BC}$.
F. Temporarily assume that $AB < AC$.

Case 2:

Given: $\frac{1}{2y + 4} = 20$

Prove: $y \neq -2$

Assume $y = -2$

$\frac{1}{2(-2)+4} = 20$

$\frac{1}{0} \neq 20$

not possible

Contradicts the given

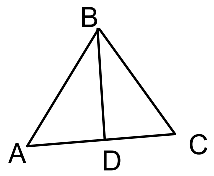
Our assumption is false

$y \neq -2$

HW p338-340
#s 1-9, 11-18 and this proof below.

Given: $\triangle ABC$ is NOT isosceles
$\overline{BD} \perp \overline{AC}$

Prove: D is NOT the midpoint of $\overline{AC}$



Attachments

Hinge_thm.gsp